

**EOSDIS Core System Project**

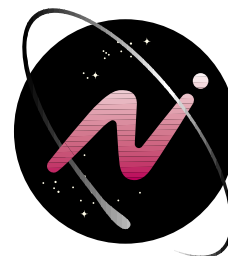
# **ESDIS-NSI Inter-Project Agreement**

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National Aeronautics and  
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Goddard Space Flight Center  
Greenbelt, Maryland \_\_\_\_\_



# ESDIS-NSI Inter-Project Agreement

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**Change Information Page**

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## **1. Overview and Scope**

This document describes the Inter-Project Agreement (IPA) between the Earth Science Data and Information System (ESDIS) Project Office, and the NASA Science Internet (NSI) - Earth Observing System (EOS) Networking Project in support of the EOS Data and Information System (EOSDIS) External Network requirements. The ESDIS project office is located at NASA Goddard Space Flight Center, and the NSI-EOS Networking Project (referred to as NSI throughout this document) is located at NASA Ames Research Center.

This is version 2 of this IPA. As a result of reassignment of network functions within EOSDIS, it has been decided to put the description of the services NSI will provide for EOSDIS in the NSI Interface Requirements Documents -- only an overview will be contained in this document.

### **1.1 EOS Overview**

The Earth Observing System (EOS) Project consists of several missions to be launched in the 1998 to 2012 timeframe. Each mission includes one or more scientific instruments observing the earth. The EOS project-funded scientific investigators include a total of about 600 scientists at over 150 sites around the world.

The EOS Data and Information System (EOSDIS) consists of the data systems, archives, processing facilities, user support systems, and networking facilities needed to provide a 15-year continuous information base of the entire Earth system from EOS and affiliated data sources.

Data from EOS instruments are sent to one or more of the EOS Distributed Active Archive Center (DAAC) sites in the U.S., where the data are processed, stored, and made available to the scientific community. The EOSDIS Core System (ECS) includes these DAACs and related facilities. The data will be made available to the project supported scientists and the broader community through the DAACs, both electronically and via media distribution. Electronic access will be provided primarily over the NSI and the general Internet.

#### **1.1.1 EOSDIS Networks Overview**

The EOSDIS overall network requirements are grouped into three categories, primarily by availability and security requirements.

At the high end of availability and security requirements are network services in support of "mission critical" functions, including spacecraft and instrument command, control, and data capture. Due to the critical nature of these functions, the network must be engineered for extremely high availability and security.

The second type of network requirement is for data transfer in support of "internal data production". These transfers will be primarily between DAACs. These transfers have



a higher tolerance for short outages than do the command and control functions, but the network must still have high availability and security.

A third type of network requirement is for "external science access" -- connectivity between the science users and the DAACs and other EOSDIS elements. This includes access for many project-supported scientists, the general science community, and other users. The availability requirement is lowest for this type of use, and the network is open to external users -- and is therefore relatively insecure.

Providing high availability in computer networks is expensive. Increasing the availability generally requires redundancy - multiple redundancy may be required to provide the highest levels of availability. Therefore, to minimize the total cost of the networks for EOSDIS, two separate networks are being developed, based on the three availability levels described above:

- The EOSDIS Backbone Network (EBnet) is being built by Nascom (GSFC Code 540) to support the mission critical and internal data production requirements.
- The EOSDIS External Network is being provided as part of the NASA Science Internet (NSI) Project to support the external science access requirement.

This IPA describes the agreements between EOSDIS and NSI for NSI to provide the latter of these networks, the EOSDIS External Network.

## 1.2 NSI Overview

The NASA Science Internet (NSI) is the NASA institutional network for providing cost-effective, reliable, open, internetworked access to the Agency's remotely distributed resources, such as computing facilities, science data archives, databases, and users and investigators to support NASA-funded missions. NSI is a high-speed, multi-protocol, international network that supports both TCP/IP and DECnet protocols. NSI supports NASA sciences, applications, and technologies with transparent wide-area network connectivity to NASA researchers, computational resources, and data centers worldwide. NSI provides, maintains, and operates a computer communications network that serves the needs of the NASA science and research community with high performance links and gateways connecting to several thousand research, education, and public commercial networks via the Internet and national research networks in Europe, Asia, and the other continents.

The NSI Network Operations Center (NOC) monitors circuits continuously (24 hours a day, 7 days a week) to ensure constant availability of circuits and services. The NSI NOC coordinates with other network provider NOCs and campus network operators to provide expeditious resolution of network outages. The NSI distributed management model provides a hierarchical escalation infrastructure which allows for effective scaling and gives the user a single point of contact for all problem reporting. The NASA Information Center

(NIC) at Ames provides user assistance, on-line services, and applications support.

### 1.2.1 NSI-EOS Networking Project

Recognizing the importance and uniqueness of the ESDIS Project, the NSI-EOS Networking Project Team was established in 1993 to provide services and support for the EOSDIS External Network. The NSI-EOS Networking Project Team works in close collaboration with the ESDIS Project in the generation and implementation of EOSDIS External Network requirements.

### 1.3 EOS Requirements Traceability

The requirements for NSI-EOS network services are included in the "ESDIS Project Level 2 Requirements, Volume 0: Overall ESDIS Project Requirements" (423-10-01-0, February 18, 1993). Section 5.3 describes the Networking and Communication Requirements. The Overall ESDIS Project Requirements refer to "Mission Success" network services which, in the context of NSI support refers to the External Network requirements.

- 5.3.1.a.3 (3295): The EOSDIS "Mission Success" network services shall provide access to EOS data products and services to science investigators and other users.
- b. (3296): All EOSDIS networks shall provide performance, availability, and security consistent with the functions provided.
- c. (3297): All EOSDIS networks shall incorporate network management, which shall include:
  - Configuration Management
  - Testing and Validation
  - Fault Detection, Isolation, and Recovery
  - Data Collection, Analysis, and Reporting
- d. (3298): All EOSDIS networks shall accommodate usage growth over the life of EOSDIS, with minimal disruptions.
- 5.3.4.a. (3306): The EOSDIS "Mission Success" network services shall provide access to DAACs and EOSDIS data to scientific investigators and other users.
- b. (3307): The EOSDIS "Mission Success" network services shall provide the following capabilities:
  - File Transfer
  - Process to Process Communications
  - Remote Login
  - Electronic Mail

Network Management  
Network Access and Security

- c. (3308): The NASA Science Internet (NSI) shall be responsible for the overall EOSDIS "Mission Success" network services, engineering, and management.
- d. (3309): The EOSDIS "Mission Success" network services shall provide for access [to the DAACs and EOSDIS data products] via commercial, institutional, and educational networks, including NSFnet, NREN, and BITNET.
- e. (3310): The "Mission Success" network services shall provide for international access [to the DAACs and EOSDIS data products] as specified in the appropriate MOUs.

## **2.0 IPA Overview**

Through its collaboration with NSI, the ESDIS Project seeks to provide sufficient network service to EOSDIS investigators, Instrument Support Teams, and Quality Assurance Science Computing Facilities for the performance of their work. ESDIS also seeks to provide sufficient network service for the transfer of data from the DAACs to the Internet to satisfy user interactions with the EOSDIS information services and user requests for electronic delivery of data products.

This Inter-Project Agreement (IPA) describes the requirements classes given to NSI, the agreements between the ESDIS and NSI projects, and the related interfaces to other organizations.

## **2.1 Requirements Process**

ESDIS provides the requirements for EOSDIS External Network connectivity to NSI. In the context of this IPA, an EOSDIS External Network requirement is defined as network connectivity needed to support external science community access to EOSDIS data. Network bandwidth requirements are determined by a number of factors including the ESDIS User Model Scenarios and Data Model Analyses.

### **2.1.1 Documentation Tree**

The next level of detail of the requirements (below this IPA) for NSI connectivity (including performance requirements) are contained in two Interface Requirements Documents (IRDs). The ECS-NSI IRD contains the requirements for NSI services provided to ECS elements, including the DAACs and the EOC. The ESDIS - NSI IRD for Non-ECS Elements contains the requirements for the remaining elements which are not part of ECS.

Both of these IRDs contain detailed descriptions of the services required. However, the detailed listing of sites and their implementation schedule requirements are not directly included; instead, a separate database is maintained by NSI. For the ECS requirements, the database is referenced in DID-223, "ECS External Traffic Requirements", maintained by ECS. The NSI maintained requirements are reviewed quarterly by ESDIS and Mission to Planet Earth (MTPE) project scientists.

The ECS-NSI Interface Control Document (ICD) describes the details of the interfaces with ECS elements, including the management interface. However, no ICD is needed for the non-ECS facilities. Instead, NSI will generate an "Implementation Plan" describing how each of the requirements is implemented using industry-standard TCP/IP Internet interfaces.

## 2.2 Agreements

The ESDIS Project agrees to define EOSDIS External Network service requirements and prioritization criteria, including timely updates to requirements specifications. ESDIS agrees to provide the funding to NSI to implement these requirements.

NSI agrees to implement these requirements in compliance with the ESDIS prioritization criteria and budget guidelines. NSI is responsible for engineering the network services to be provided, and for obtaining and providing all necessary equipment and circuits. NSI will interface to site facilities or to external networks as required by the above Interface Requirements Documents (IRDs).

NSI will participate with the ESDIS integration team activities by supporting, as appropriate, various levels of testing to be performed on ESDIS and its subsystems. As background for the ESDIS integration team, NSI will provide a report giving an overview of the typical acceptance testing procedures performed by NSI on each new service implementation.

NSI will also participate with EOS system management activities in managing the networks and supplying network management information to the EOSDIS Systems Monitoring and Coordination Center (SMC) and the Local System Management (LSM) facilities at each of the DAACs. NSI will provide a 24x7 Network Operations Center (NOC) to manage NSI reliability, performance and operations, and a Network Information Center (NIC) to assist the EOSDIS users with new applications and tools to optimize use of the EOSDIS External Network.

### **3.0 Requirements Overview**

The EOSDIS External Network requirements given to the NSI are classified into groups with similar requirements. These classifications are:

#### **3.1. Network Service Requirements**

- 3.1.1 Instrument Support Terminal (IST) connectivity, to provide instrument monitoring capabilities.
- 3.1.2 Quality Assurance Science Computing Facilities (QA SCFs) connectivity, to provide quality assurance data to instrument QA investigators.
- 3.1.3 Connectivity from the Distributed Active Archive Centers (DAACs) to the Internet, to provide transfer of EOSDIS data and information to general users.
- 3.1.4 Basic User Service, to assure that EOS-funded investigators in the US have adequate Internet access to the EOSDIS and affiliated facilities.

#### **3.2. Management Requirements**

- 3.2.1 Problem Reporting (Fault Management) interface with EOSDIS and ECS.
- 3.2.2 Configuration, Accounting, Performance and Security Management and reporting.
- 3.2.3 User Support.
- 3.2.4 Requirements Management.

Further details on these requirements are found in the IRDs.

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## **4. Organizational Interfaces**

This IPA establishes a partnership between NSI and the ESDIS project. As a result of this partnership, ESDIS may represent NSI and NSI may represent ESDIS to other organizations. This section describes the representative authority that NSI and ESDIS agree to allow each other.

Both NSI and ESDIS agree to represent the other partner in a way that protects the interest and preserves the integrity of that partner. Prior coordination will occur before either partner makes any commitment impacting the activities, schedules or resources of the other.

### **4.1 EOSDIS Core System (ECS)**

NSI and ECS interact directly to discuss details of technical interface requirements. However, technical direction for ECS is provided only by the ESDIS Project. NSI input on ECS issues is welcome as recommendations to the ESDIS Project.

NSI may support ECS studies of performance characteristics of NSI and the Internet. These studies may lead to suggestions from ECS to upgrade NSI or Internet circuits for users whose performance level is considered to be inadequate. ESDIS will review these suggestions and may submit them to NSI as additional requirements.

NSI and ECS also interact technically for the design and development of the automated exchange of network management information between NSI and EOS management services. These management information exchange interfaces are described further in the ECS-NSI ICD.

### **4.2 GCDIS and CEOS**

The Global Change Data and Information System (GCDIS) and the Committee on Earth Observing Satellites (CEOS) focus on interagency and international cooperation for earth observing applications. Network cooperation is a significant function of these groups. NSI, in support of both the MTPE program and the ESDIS Project, is responsible for implementing the "science access" networks needed by these groups.

The necessary funding and requirements for these non-EOSDIS networking activities are provided by the MTPE program, either directly to NSI or through the ESDIS project.



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